

REMARKS

The Examiner states in Item 2 of his Second Advisory Action that new issues have been raised that would require further consideration and/or search. These issues are addressed herein..

Previously, the Examiner stated in item 2 of his First Advisory Action that the applicant's amendment dated December 8, 2003, would not be entered as it raises new issues. The issues are identified in the note (d) as 'Claims 1 and 8 claim "a mixture consisting of" is a new issue'.

Previously, in a telephonic conference with the Examiner on January 21, 2004, the Examiner confirmed that these were the only new issues. Applicant has amended his December 8, 2003 amendment so that it now reads using the old wording "a mixture that is" instead of the contested wording "a mixture consisting of:". The amendment should now be in condition for entrance as there are no longer any new issues.

Avotins et al. (US 5,464,465) teaches the use of acrylonitrile as a binder in a product, and the mixture, in amended claim 1, is not composed of acrylonitrile. A further distinction between the Applicant's invention and Avotins' is, as stated in claim 1, Applicant's invention is a process for making metallized iron, while Avotins is a process for producing agglomerates. Avotins process does not teach the inclusion of a reductant, which is required using the disclosed process. As will be addressed in more detail later, coke breeze is claimed by Avotins et al, but as a fiber not a reductant. Avotins does not teach the inclusion of in situ reductants to reduce iron oxide to

iron.

Independent claim 1 is further amended, along the lines of the Examiner's Interview Summary dated 3/28/03 to claim a RHF (i.e. rotary hearth furnace). To further clarify applicant's invention, claim 1 is amended to use the transition phrase "process consisting essentially of". As stated in MPEP 2111.03, "consisting essentially of" limits the scope of a claim to the specified materials or steps, and those that do not materially affect the basic and novel characteristic(s) *re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 461 (CCPA 1976). In compliance with the scope of MPEP 2111.03, claim 1 is amended to include the specified materials or steps, and those that do not materially affect the basic and novel characteristic(s). These steps include claims 7 and 11. Therefore, following their inclusion into claim 1, claims 7 and 11 are redundant, and are canceled. Previously, claim 7 stated that there the briquettes were "initially in an oxidizing atmosphere followed by further heating in an inert or reducing atmosphere"; and previously claim 11 stated that the green briquettes were "fed directly to the heating furnace." On page 9, lines 1-5 of the Remarks section, arguments for allowing claim 1 are set forth. Applicant teaches an oxidizing atmosphere. The cited prior art teaches a reducing atmosphere.

Amended claim 1 now reads, "direct feeding the green briquettes into a rotary hearth furnace." Note, there is no drying step. The green briquettes go directly into a rotary hearth furnace that is about 1000 ° C. In accordance with MPEP 2111.03, claim 1 is amended to include the steps of claim 7, which include the step of "heating in an oxidizing atmosphere, followed by further heating in an inert or reducing atmosphere."

Dependent claim 2 became unnecessary, and was canceled.

Dependent claim 6 was amended to delete “any”, as it was superfluous, and “coke breeze” was deleted, as it may be ambiguously construed as a both a fiber and a reductant.

Previously dependent claim 8 was amended to include the additional limitation of “a mixture that is” inclusive of “steel alloy materials”; and claim 8 is drafted in independent claim form.

Dependent claim 9 was amended depending on claim 1, as claim 8 is now independent.

Claims 1, 2 and 4–13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Avotins et al. (US 5,464,465). Examiner cites coke breeze and paper fibers.

Avotins does not teach a process for forming a metallized briquette (i.e., iron) as claimed in claim 1, and steel in claim 8. Applicant’s briquette is not composed of Avotins’ central component, acrylonitrile, (see col. 2, line 19). Avotins **does not teach** a moisture level of 0% to 5%, even with vacuum filtration, which is an extra processing step. The moisture level cited by Avotins’ is around 8% to 10%. The coke breeze cited in claim 11 of Avotins is claimed as a fiber, not a reductant. Avotins does not teach “heating the green briquettes initially in an oxidizing atmosphere followed by further heating in an inert or reducing atmosphere at a temperature from about 1000°C to about 1550°C for a period of 6 to 20 minutes, therein metallizing iron forming metallized briquettes.” As now, amended claims 1, 4-5, 8-10 and 12-13 overcome the 103 rejection. Claims 2, 7 and 11 are canceled.

Claims 1, 2, 7, and 10-13 stand rejected under 35 103(a) as being unpatentable over Crowe (US Patent 2,865,731) in view of Avotins et al. (US 5,464,465). Examiner cites coke

breeze and paper fibers. Examiner cites Crowe (col. 4, lines 6-9), stating that the temperatures are sufficient to burn the paper.

Claim 1 is amended to include claim 7, where claim 7 stated [a process] that “initially heated in an oxidizing atmosphere, followed by further heating in an inert or reducing atmosphere.” In Crowe (col. 4, lines 6-9), the atmosphere is reducing, **not oxidizing** as now currently amended claim 1 reads. Examiner is reminded that now canceled claim 7 has always claimed an oxidizing atmosphere and, therefore, should never have been rejected. As the Examiner noted, Crowe does not teach the addition of a reductant. Hence a reducing atmosphere is required to reduce the iron oxide to iron (col. 4, line 3). This is in contrast to Applicant’s invention, where there is sufficient reductant to act as a fuel as well as an in situ reducing agent.

Neither Crowe nor Avotins teach a metallization process, but instead teach a briquetting process. Crowe (US Patent 2,865,731) teaches that the briquettes are air dried (col. 3, line 44) or dried at 250°F (which is 121°C) (col. 2, line 21) prior to being metallized. In addition, Crowe teaches that the briquette is formed from a thick aqueous pulp of cellulose fibers (col. 4, line 13), while applicant teaches that the briquette is combined in dry form from iron bearing material, reductant, and cellulose fibers, therein keeping the moisture content below 5%. Neither Crowe nor Avotins reads on the steps of: direct feeding the green briquettes into a rotary hearth furnace; and heating the green briquettes initially in an oxidizing atmosphere followed by further heating in an inert or reducing atmosphere at a temperature from about 1000°C to about 1550°C for a period of 6 to 20 minutes, therein metallizing iron forming metallized briquettes. Applicant asserts that claims 1 (currently amended), 2 (now canceled), 7 (now canceled), 10 (previously presented), 11 (now canceled), and 13 (previously presented) overcome the Examiner’s rejections.

Claims 1, 2 and 4-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over

Wienert (US Patent 5,421,859) in view of Grandlin et al. (US Patent 5,833,735). Wienert discloses a process for making a hard composite from coal and iron ores. Paper is not disclosed, but Grandlin discloses a binder of paper and limestone.

Wienert in US Patent 5,421,859 teaches a process wherein the briquettes are first dried, then carbonized and then cooled (col. 2, lines 49-54). The desired temperatures for drying are 350°C to 475°C. As previously stated Applicant's process does not utilize pre-drying the briquettes. The green briquettes are charged into a 1000°C RHF. Grandlin discloses a steel making process, wherein the briquettes are added to a melting vessel containing pig iron melt. Applicant's process employs a rotary hearth furnace. There is no molten pig iron present, and no pre-drying. Grandlin teaches the utility of using a blend of molasses and hydrated lime (col. 3, lines 5-7), and a potential substitute could contain some ground paper (col. 3, lines 44-45). In contrast Applicant has found that for rotary hearth furnaces, cellulosic fibers are superior to either molasses and hydrated lime or a blend containing paper. Examiner is invited to review the drawings, Figures 2 and 5, and the inventor's affidavit (co-inventor James M. McClelland), as well as the specification (page 12, lines 18-20). In the case of briquettes, no drying of the green briquettes is required and the briquettes can be directly charged to the heating furnace. Forming a green briquette enables the indurant process (drying) to be skipped prior to charging the furnace. The prior art does not teach these low levels of water, nor the ability to skip pre-drying. With specific reference to claim 9, Examiner does address where either Wienert or grandlin teach the use of a reductant to reduce iron oxide to iron. Applicant submits that the Examiner's rejections have been overcome, and requests that the Examiner withdraw his rejections. In the case of Grandlin, the prior art teaches away from the invention.

Claims 1, 2 and 4-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Canadian patent No. 1002761, in view of Avotins, et al. (US 5,464,465). Examiner states that the Canadian patent discloses a method for producing pellets from slurry.

Applicant's elements that are not taught by either patent include:

- 1) combining in a dry form materials forming a mixture that is iron bearing material, a reductant, cellulose fiber, and 0% to 5% water by weight of the mixture;
- 2) direct feeding the green briquettes into a rotary hearth furnace; and
heating the green briquettes initially in an oxidizing atmosphere followed by further heating in an inert or reducing atmosphere at a temperature from about 1000°C to about 1550°C for a period of 6 to 20 minutes, therein metallizing iron forming metallized briquettes.

Applicant's invention teaches a process for making iron and steel, not just a briquetting process.

Generally, "to establish *prima facie* obviousness of the claimed invention, all the cited limitations must be taught or suggested by the prior art". *In re Royka* 490 Fed. 2nd 981 (C.C.P.A., 1974). "A statement that modifications of the prior art to meet the claimed invention would have been well within the ordinary skill of the art at the time the claimed invention was made because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish *prima facie* case of obviousness without some objective reason to combine the teachings of the references." M.P.E.P. § 2143.02, citing *Ex Parte Levengood*, 28 U.S.P.Q. 2nd 1300 (Bd. Pat. App., 1993). Currently, while the Examiner has provided convincing arguments that briquettes with cellulose fibers have been described in the prior art, he has not addressed how green briquettes with a reductant, a cellulosic fiber, and a minimum amount of moisture can be converted into iron or steel in a rotary hearth furnace, using a process where there is no pre-drying of briquette. Unlike, for instance, with an electric arc furnace where the integrity of the briquette is largely a non-issue, with a RHF briquette integrity it


is essential to the overall productivity of the furnace. The Applicant requests that the Examiner reconsider his rejections in light of a steel or iron making process, and not just a briquetting process.

Claim 8 was converted to an independent claim, bringing the total number of independent claims to 3; therefore, no additional fees are incurred.

Enclosed are fees for the RCE and 1-month extension of time.

In view of the foregoing Amendment and these Remarks, this Application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of Applicant(s).

Respectfully submitted,



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